

# ***Track-While-Scan (TWS)***

Naval Weapons Systems

# Limitation of Traditional Search Radar:

**NO FIRE CONTROL**  
**SOLUTION**

# Problems

- ◆ Dedicated FC radar can only track one target.
- ◆ Systems usually have separate Scanning and Tracking Radars.
- ◆ The target knows it's being tracked.
- ◆ The target can initiate Counter Measures
- ◆ Weapons home in on FC radar

# ***Concept of TWS***

- ◆ *Maintain Target tracks in a computer*
- ◆ *Periodic updates from a scanning radar*

# *Functions of TWS*

- ◆ Detection
- ◆ Correlation
- ◆ Track Initiation and file generation (if a new target)
- ◆ Tracking “Gates”
- ◆ Gate prediction, smoothing and positioning
- ◆ Predict future target position

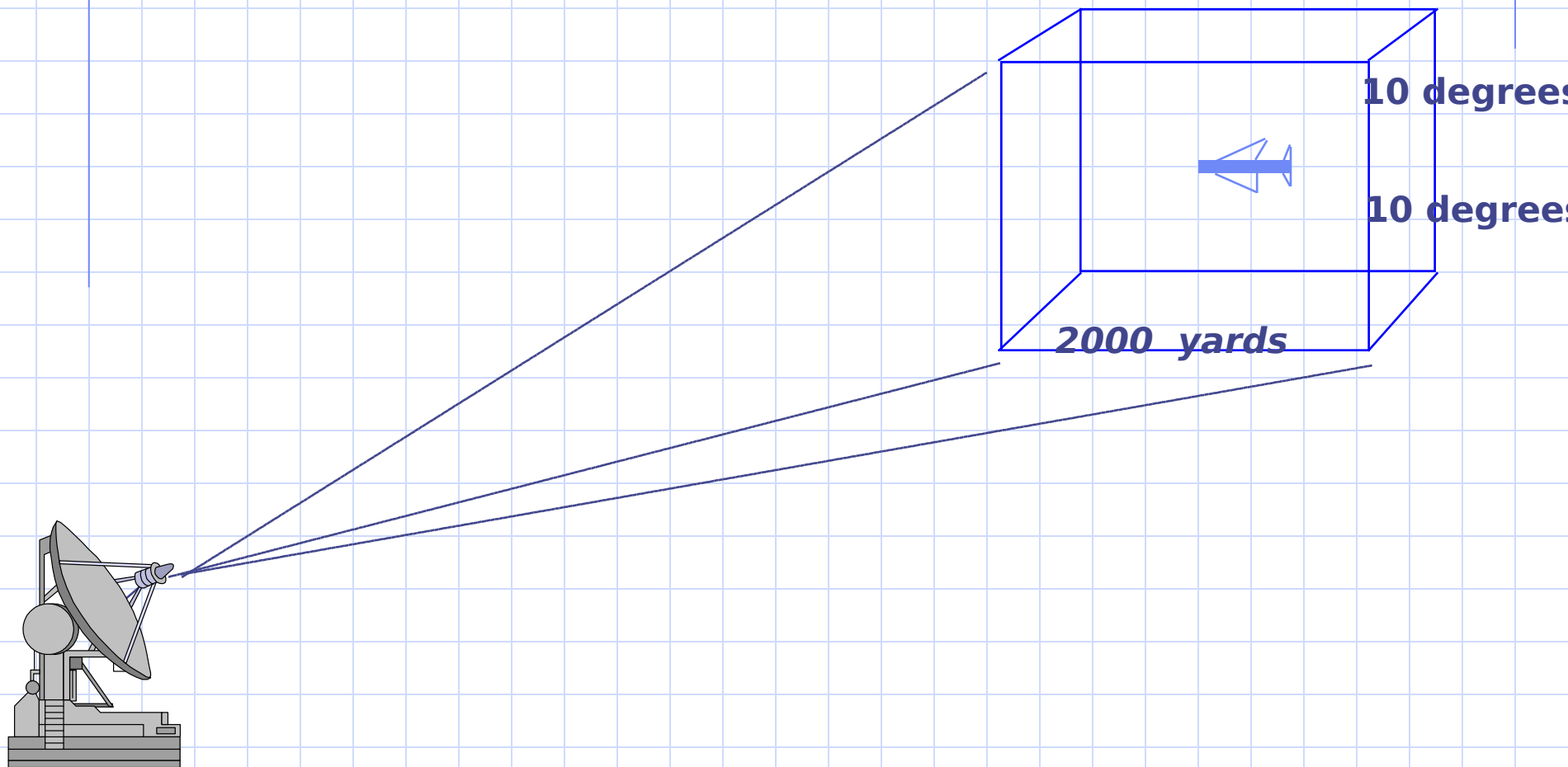
# *Gate Generation*

◆ **Acquisition gate**

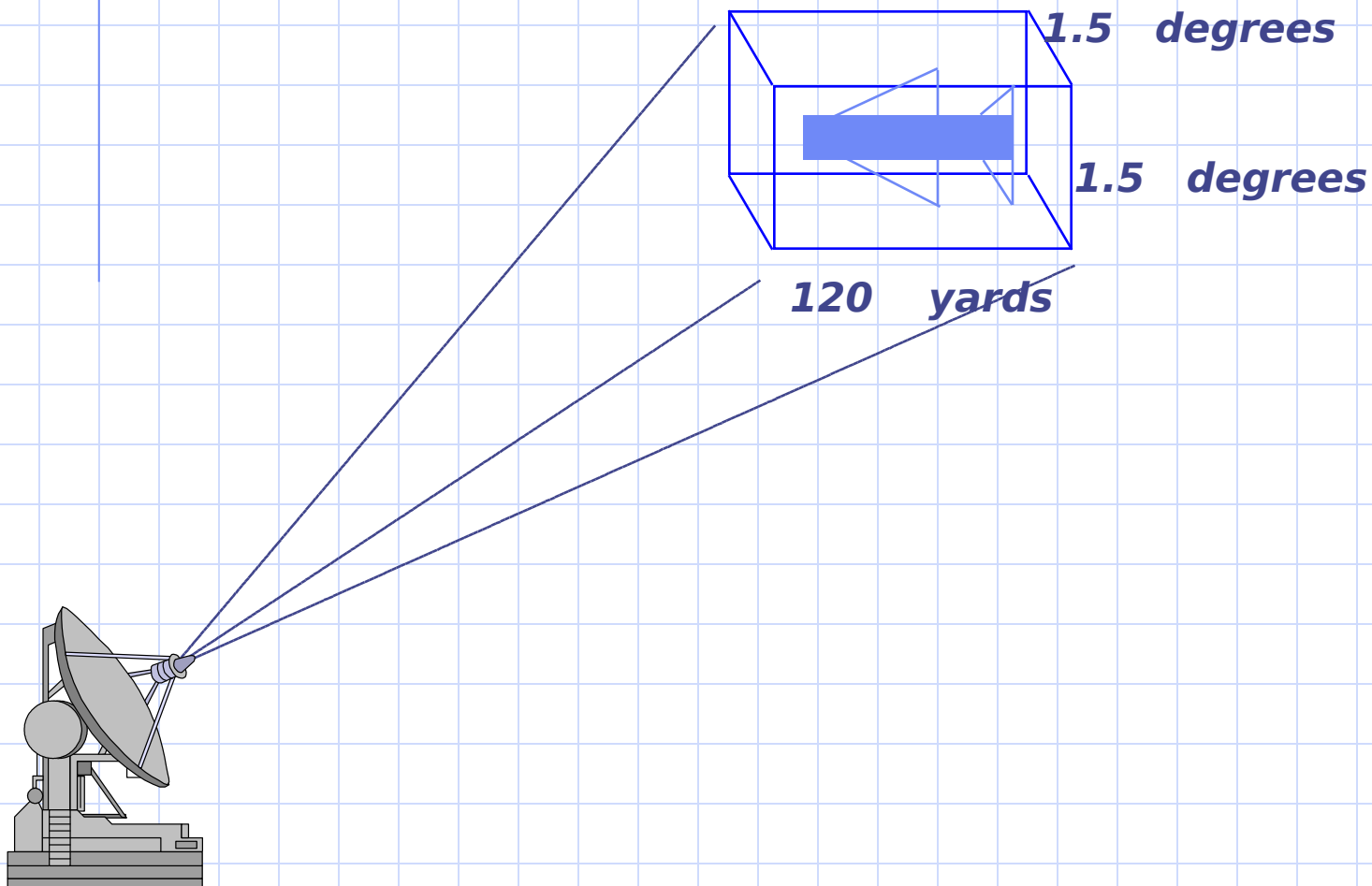
◆ **Tracking gate**

◆ **Turning gate**

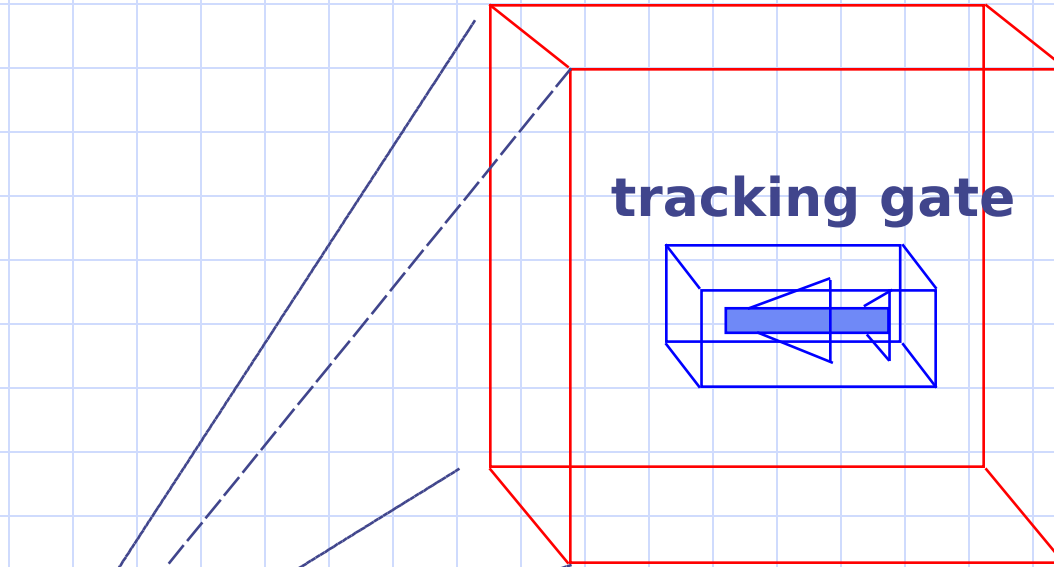
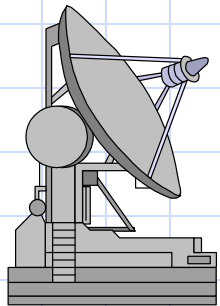
# Acquisition Gate



# Tracking Gate

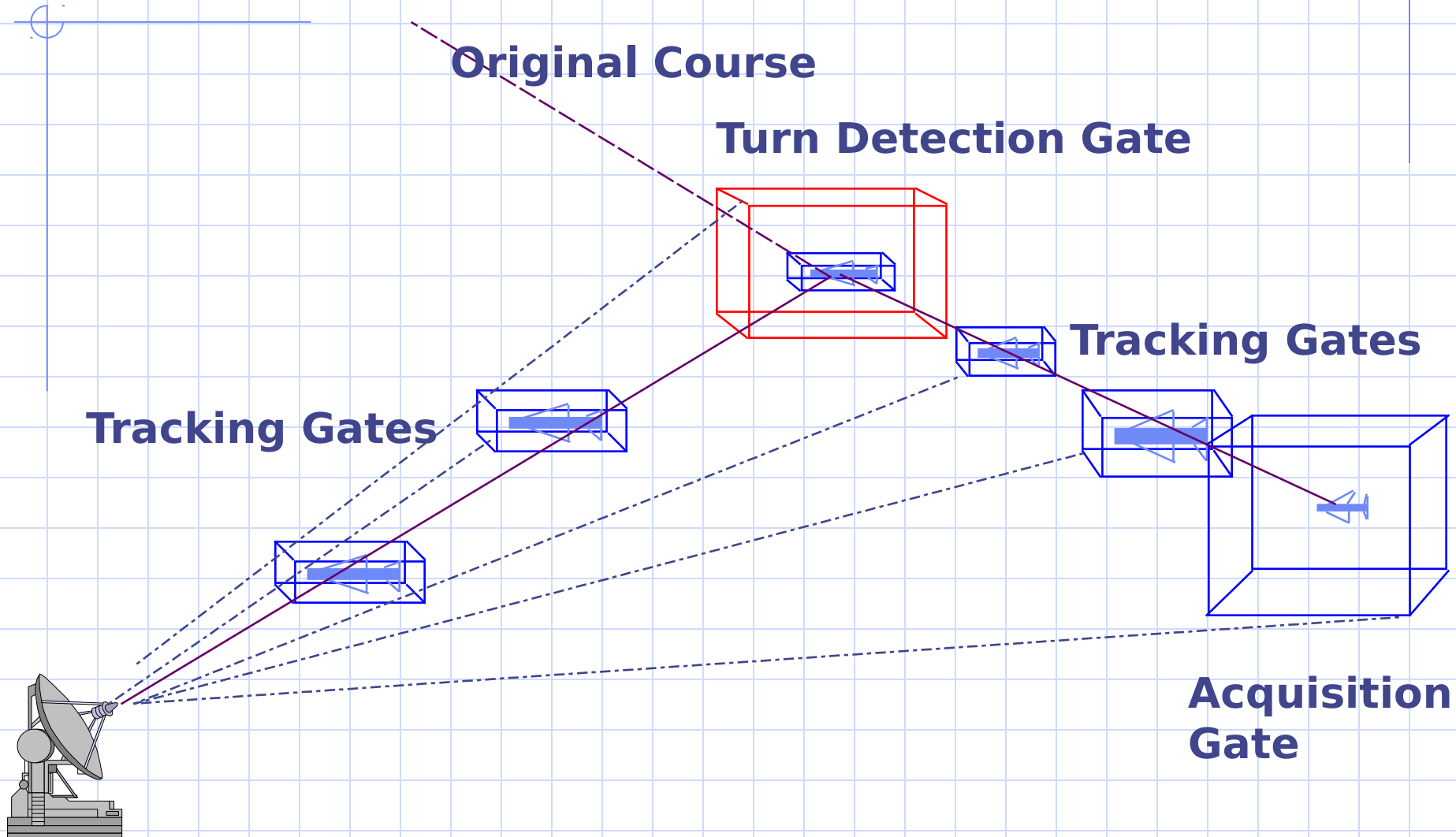


# Turn Detection Gate



*\*Computer determines size of gate*

# TWS Processing



# Track Initiation and Track File Generation

## ◆ Track file

- Store position and gate data

## ◆ Code for acquisition window

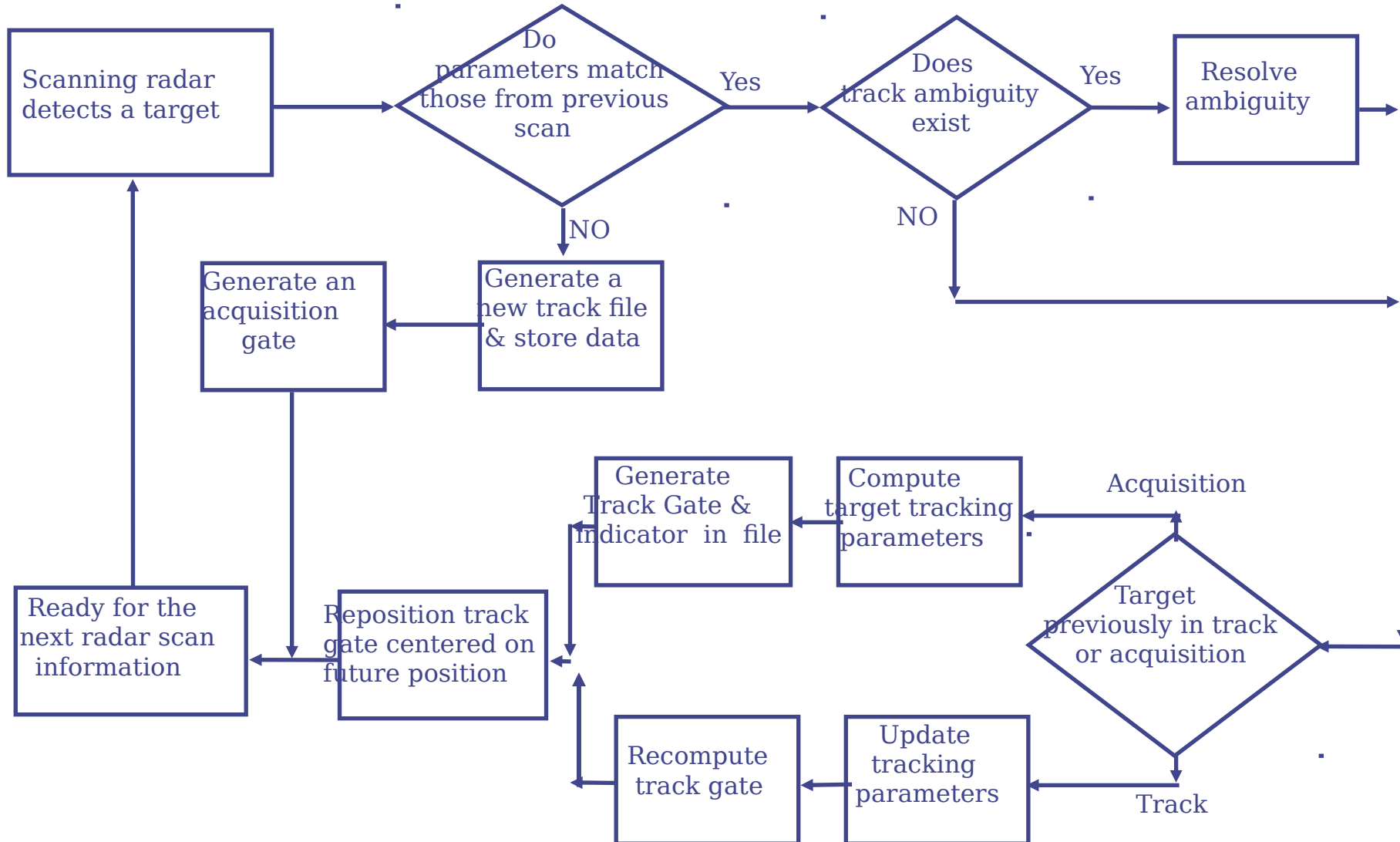
## ◆ Calculations on the return of a target are done by a computer.

- Much too slow to maintain a small tracking gate.

# Positioning and Smoothing Functions

- ◆ Repositioning and smoothing must be done within the TWS algorithm.
- ◆ “Lagging” Target
- ◆ “Leading” Target
  - This is done mathematically.

# TWS Diagram



# TWS Radar System Advantages

- ◆ Scan and Track on same system
- ◆ Tracking information used for computation of a fire control solution.
- ◆ Immediate Fire Control Solution

# Active Tracking Radar

- ◆ Phased Array
- ◆ Position beams instantly
- ◆ Random search while maintaining track
- ◆ Immediate establishment of a track

# Real World Applications

- AN/SYS-2 IADT
  - ◆ used on some missile ships
- Mk 92 CAS - FFG
- AN/SPQ-9 – 5” Gun
- Mk 25 TAS – NATO Sea Sparrow
- AEGIS C&D
  - ◆ holds track files for AEGIS
  - ◆ dedicated computer

# Davis



# DD 982 – USS Nickelson



# DDG 81 – USS W. S. Churchill



# Summary

- ◆ Radar continues scanning
- ◆ Computer predicts positions
- ◆ Track while Scan!
- ◆ Track information used for fire control solution.

# Questions?

